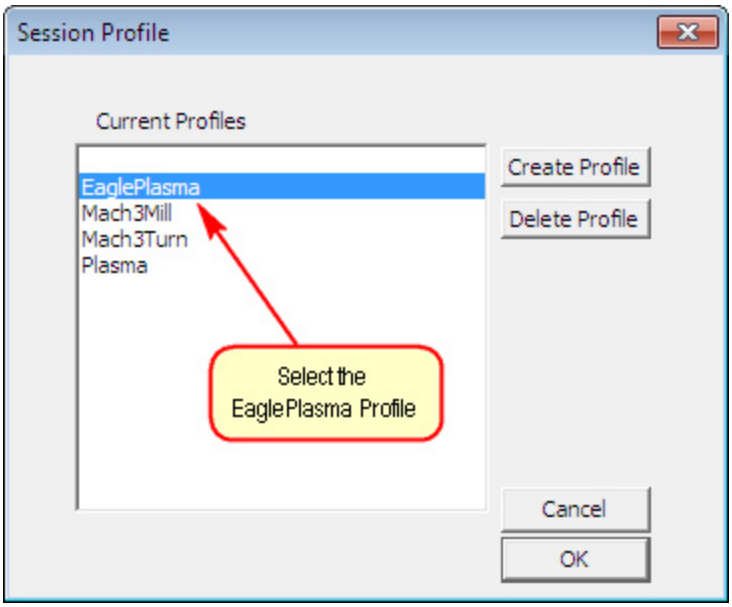
Mach3 Setup

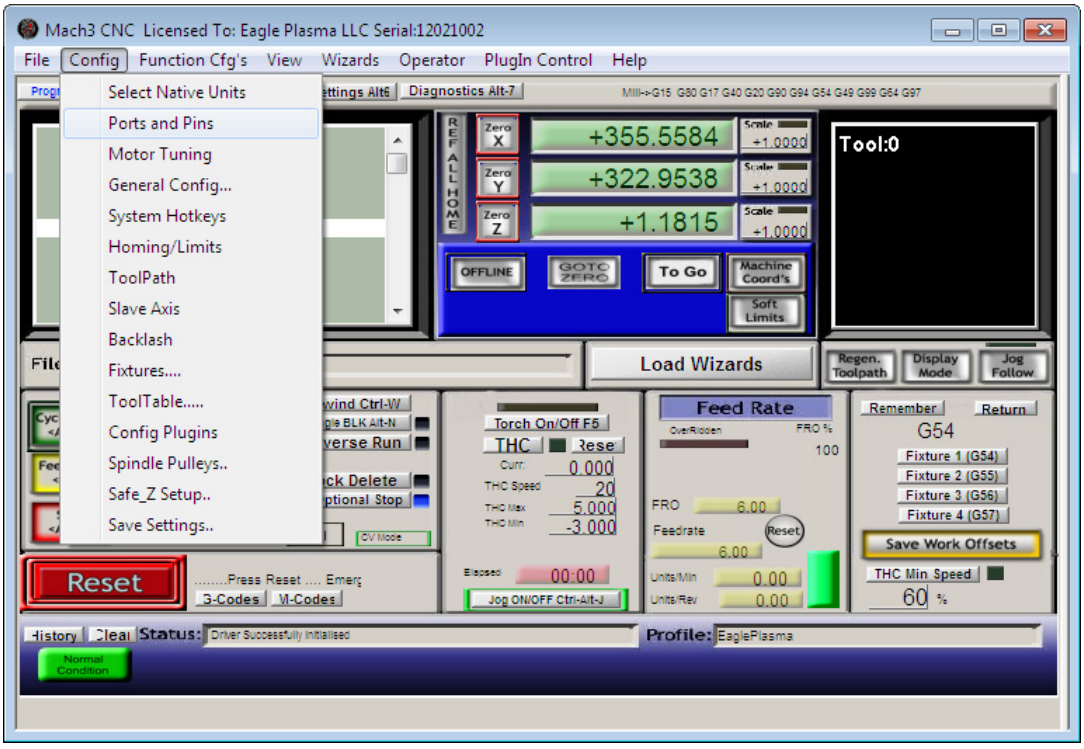
Open Mach3 using the **Mach3 Loader** icon or select **Mach3 Loader** from the Start Menu.



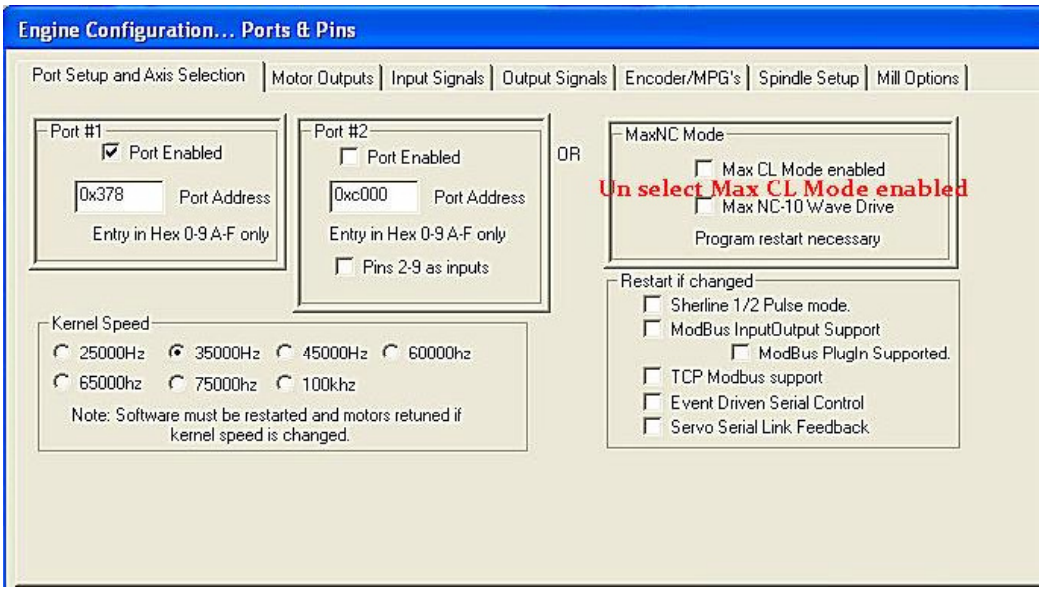
Select the **EaglePlasma** profile; click **OK**.

Once you have selected the EaglePlasma profile, the following parameters have automatically been entered. The following documentation is included as a reference.

Mach3 Setup

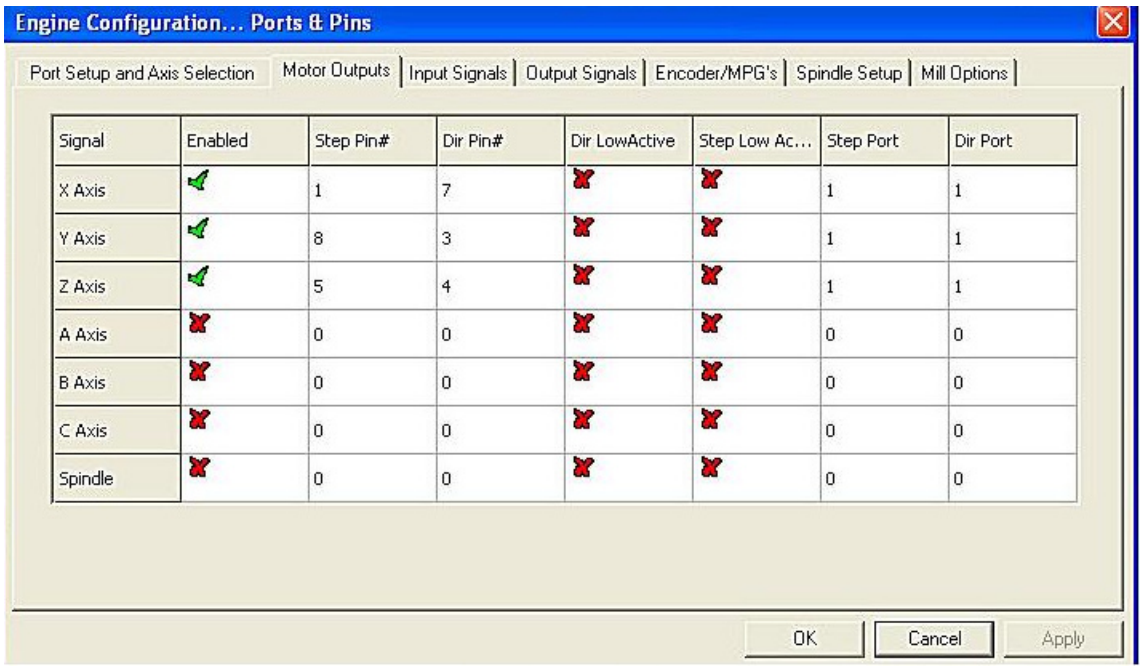


Select the **Config** menu; select **Ports and Pins**.



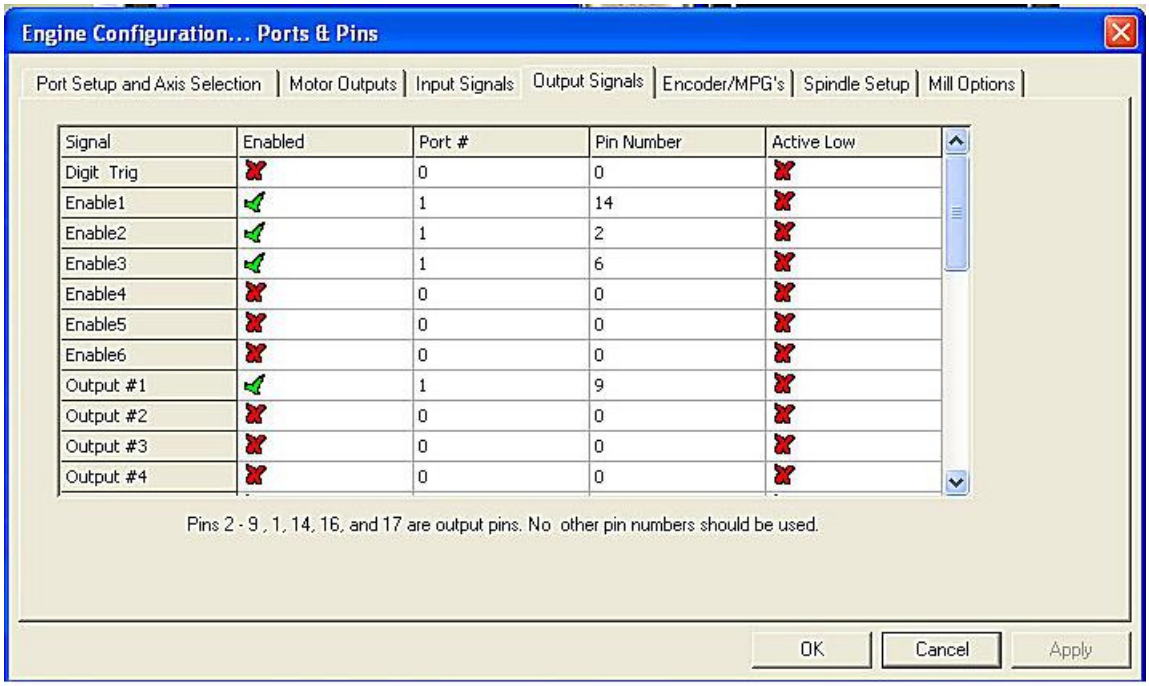
Un-select **Max CL Mode enabled**. This allows Port #1 settings to work. Set **Port #1**, **Port Enabled** and **Kernel Speed** at **35000Hz**. Click Apply.

Mach3 Setup



Signal	Enabled	Step Pin#	Dir Pin#	Dir LowActive	Step Low Ac...	Step Port	Dir Port
X Axis	✓	1	7	✗	✗	1	1
Y Axis	✓	8	3	✗	✗	1	1
Z Axis	✓	5	4	✗	✗	1	1
A Axis	✗	0	0	✗	✗	0	0
B Axis	✗	0	0	✗	✗	0	0
C Axis	✗	0	0	✗	✗	0	0
Spindle	✗	0	0	✗	✗	0	0

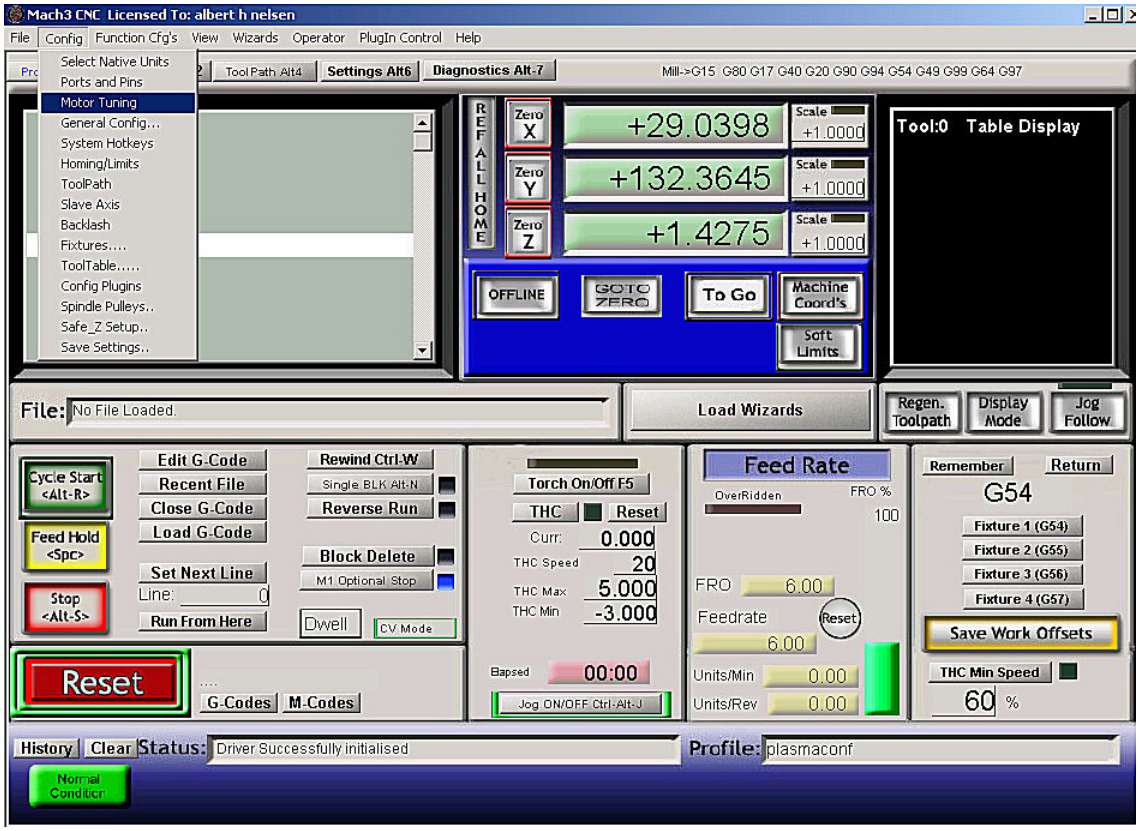
Select the **Motor Outputs** tab. Set as shown.



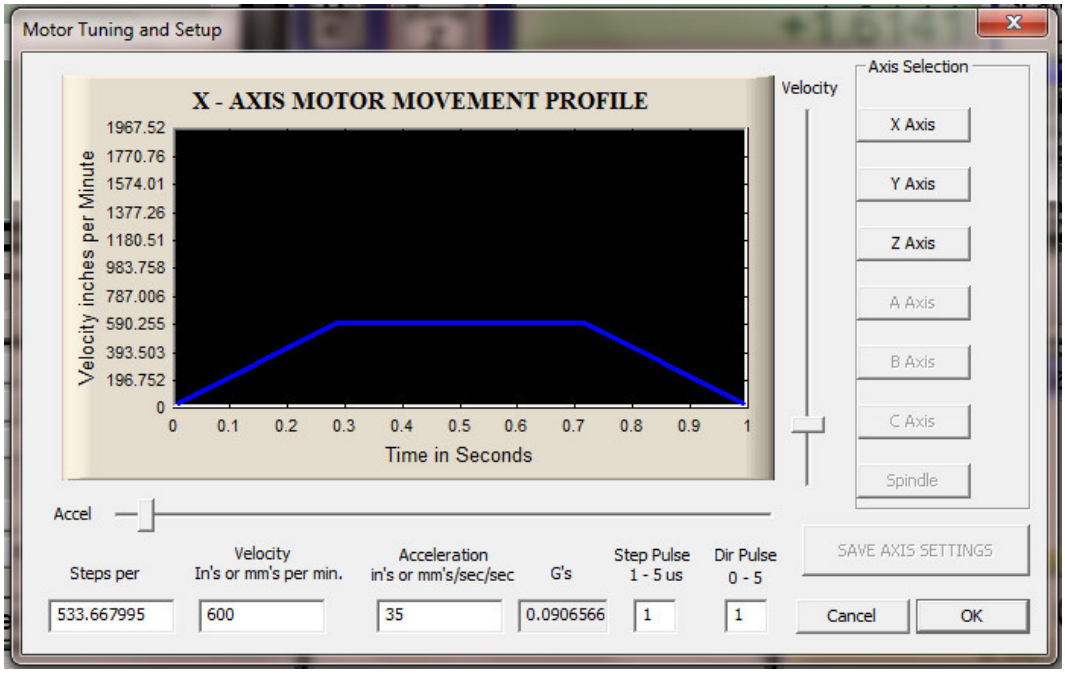
Signal	Enabled	Port #	Pin Number	Active Low
Digit Trig	✗	0	0	✗
Enable1	✓	1	14	✗
Enable2	✓	1	2	✗
Enable3	✓	1	6	✗
Enable4	✗	0	0	✗
Enable5	✗	0	0	✗
Enable6	✗	0	0	✗
Output #1	✓	1	9	✗
Output #2	✗	0	0	✗
Output #3	✗	0	0	✗
Output #4	✗	0	0	✗

Select the **Output Signals** tab. Set as shown. Click **OK**

Mach3 Setup

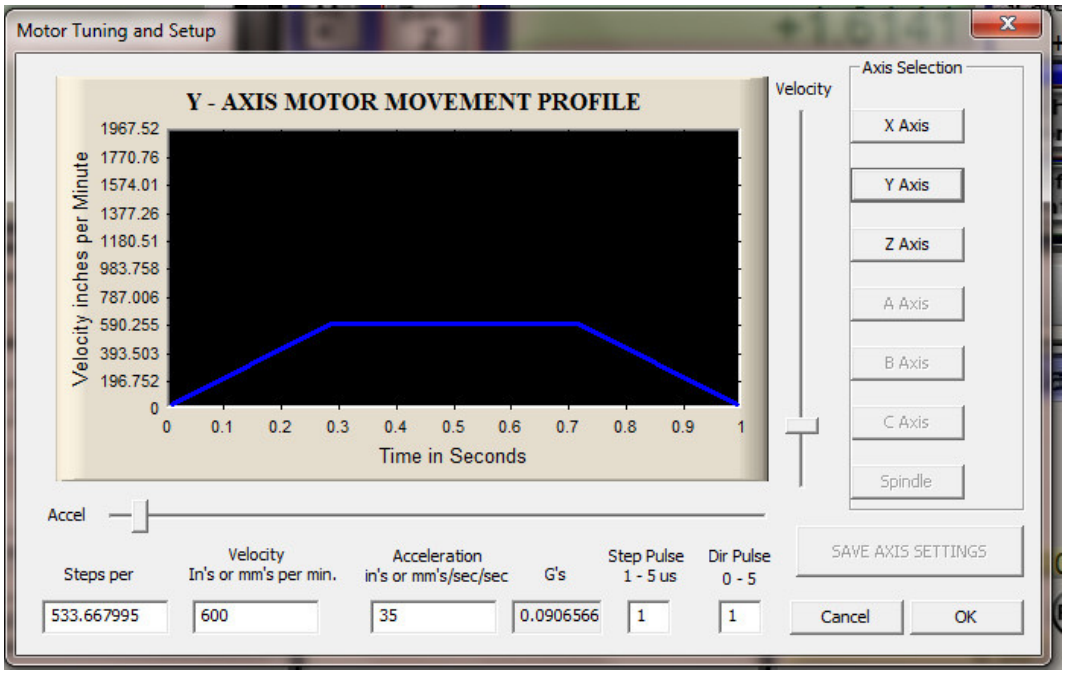


Select the **Config** menu; select **Motor Tuning**.

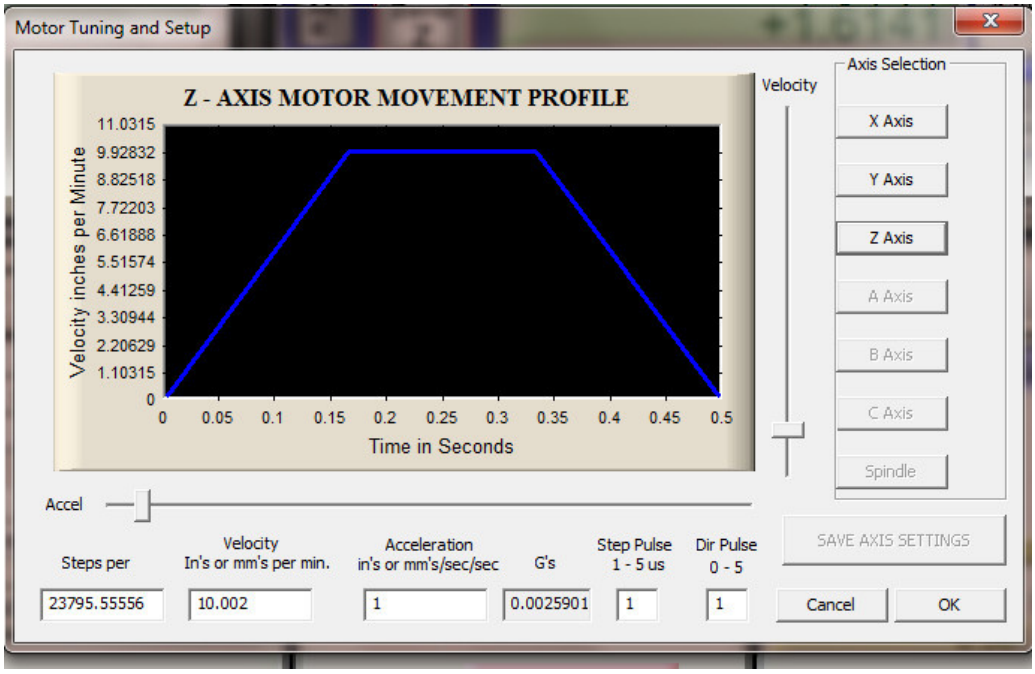


Select **X-Axis** button and enter 533.66 under Steps per, 600 under velocity, and 35 for Acceleration; click **Save Axis Settings**.

Mach3 Setup

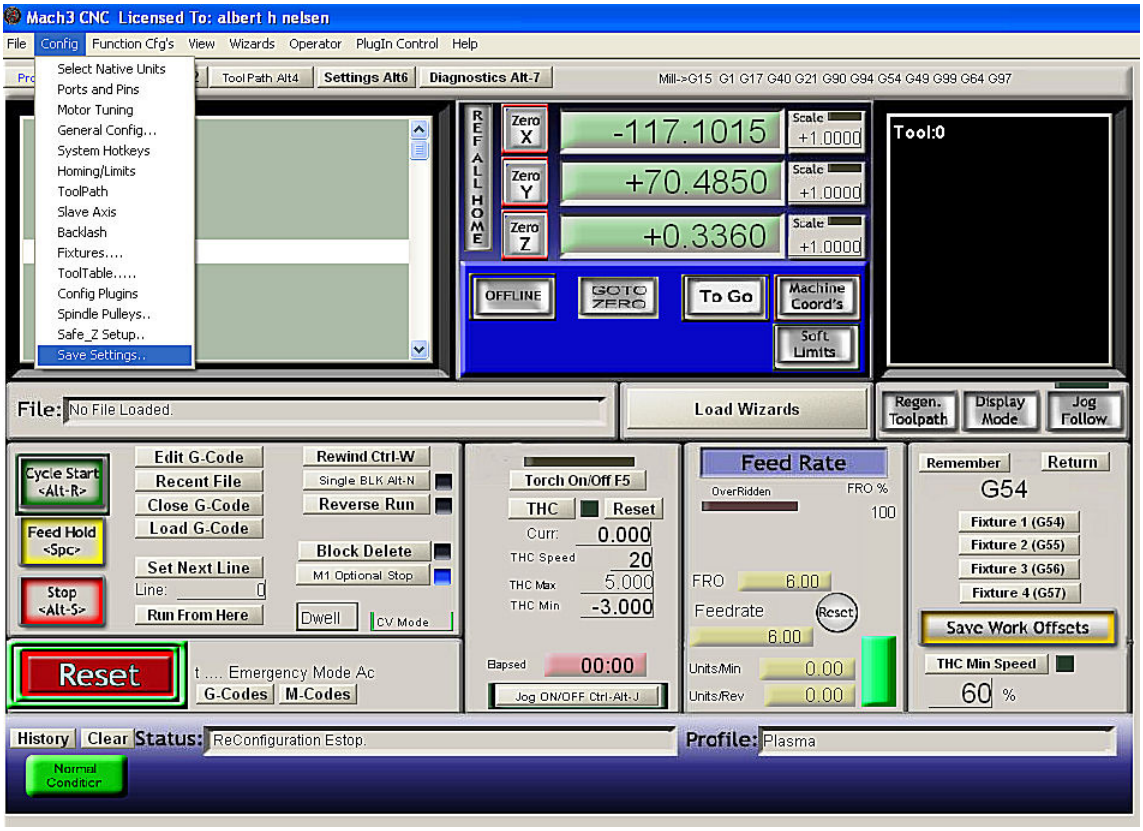


Select **Y-Axis** button and enter 533.66 under Steps per, 600 under velocity, and 35 for Acceleration; click **Save Axis Settings**.



Select **Z-Axis** button and enter 23795.55 under Steps per, 10 under velocity and 5 for Acceleration; click **Save Axis Settings**.

Mach3 Setup



Next select **Save Setting** under **Config Menu**.

* Important Notes:

- Power supply DC 12-36V *(not included)*

  **Voltage Selection:*

  12-16V DC power supply for Nema 17 stepper motors

  16-24V DC power supply for Nema 23 stepper motors

  24-36V DC power supply for Nema 34 stepper motors

  (High voltage will burn up the chips or stepper motors!!!)

  **Ampertage Selection:*

  Output current of the power supply can be calculated by the following expressions:

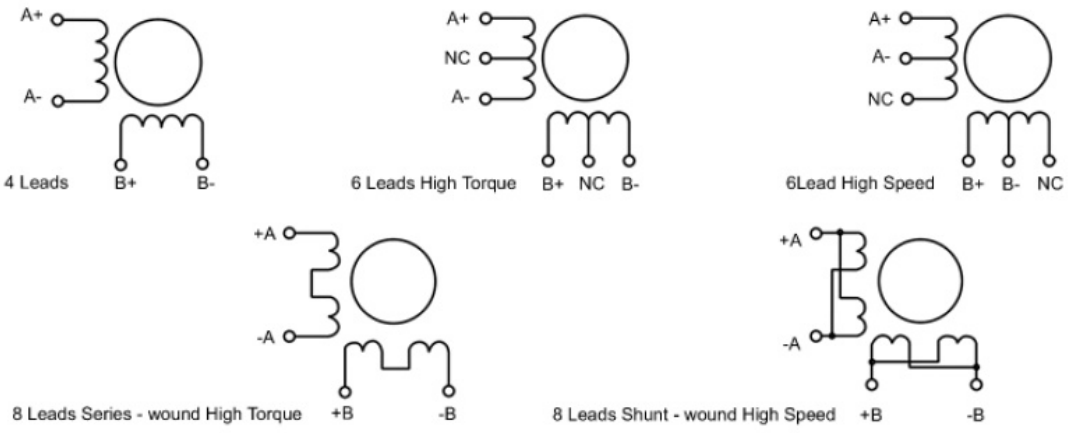
  *Output current = Rated current of your stepper motors * quantity + 2A*

  *(For example, if you want to drive 3 * 3A Nema 23 stepper motors, theoretically 24V 11A DC power supply is recommended, but higher power such as 24V 15A also will be good.*

  If you are not sure about the selection of power supply, please feel free to contact us for help)

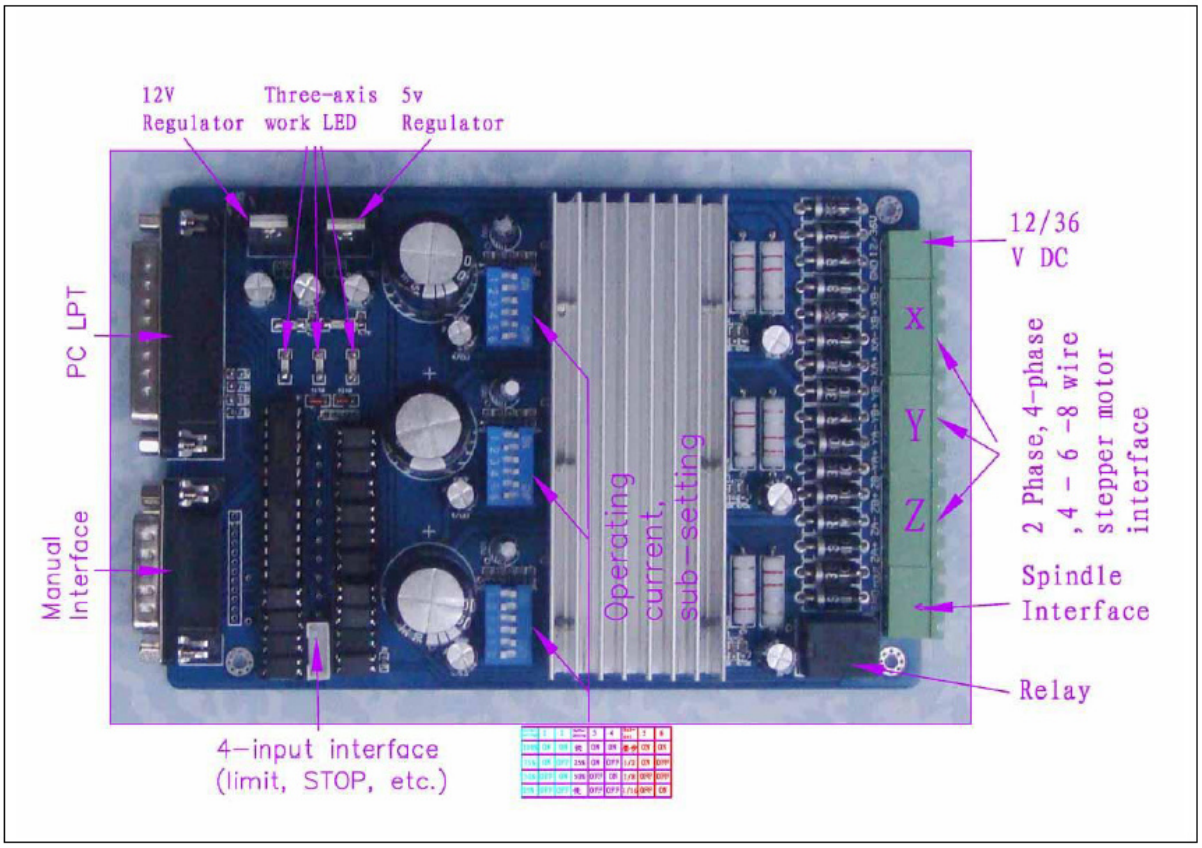
- The power output of 12V shall be applied to the radiator fan of 12V
- Driver output compatible with 2 or 4 phase, 4,6 or 8 lead stepper motors, 3A max.
- Suitable for unipolar or bipolar stepper motors.
- Voltage regulated spindle speed controlled by parallel interface as function of supply voltage.

Wiring Diagram:



Simple introductions:

Mach3 Setup



The definition of 1-PIN 25 of Parallel Interface:

PIN9	PIN14	PIN7	PIN1	PIN2	PIN3	PIN8	PIN6	PIN4	PIN5	PIN16	PIN17
spindle motor	X Enable	X Dir	X Step	Y Enable	Y Dir	Y Step	Z Enable	Z Dir	Z Step	Expand output 1	Expand output2

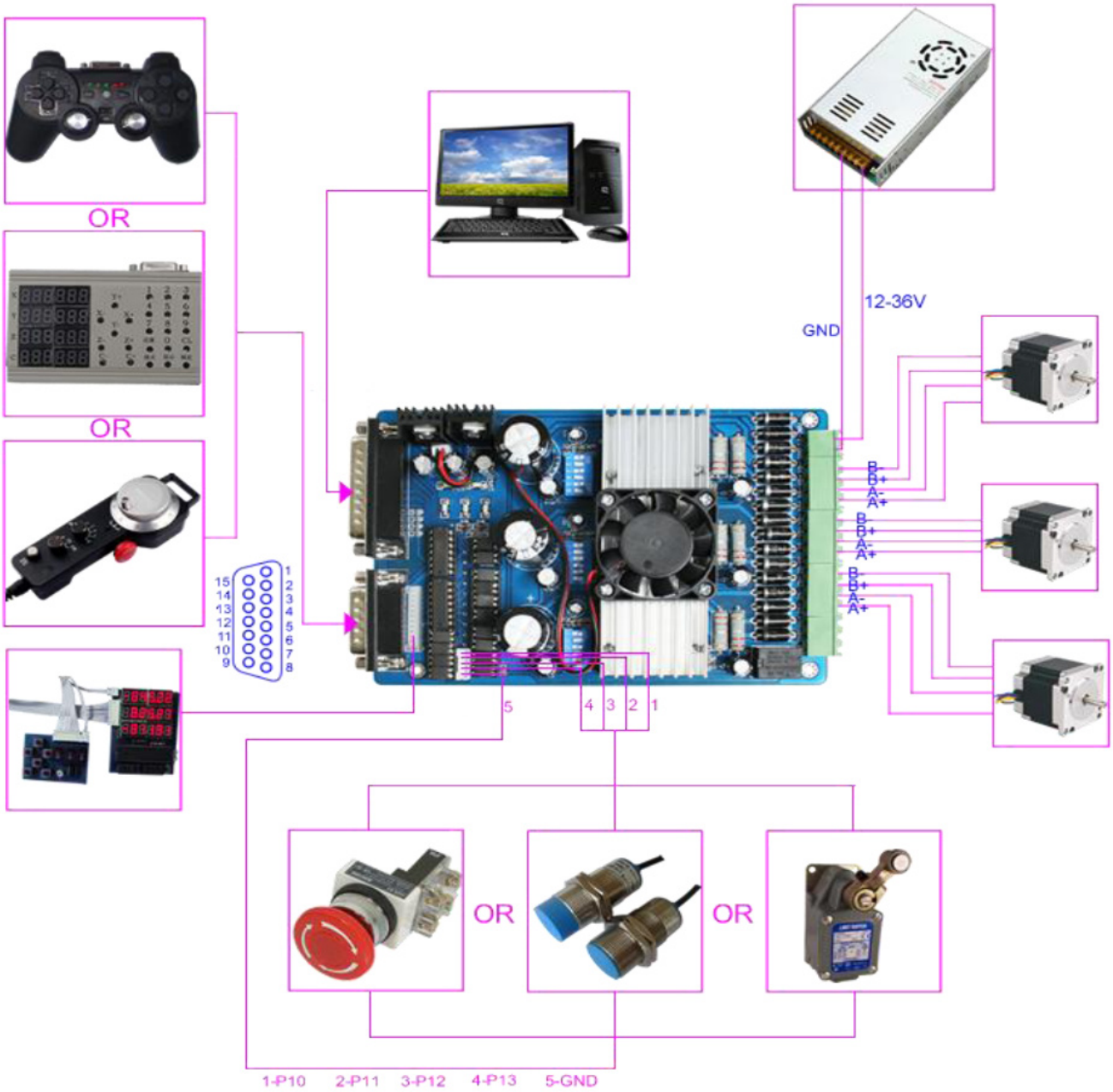
The definition of 1-PIN15 of Manual Interface:

P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
X Step	X Enable	Spindle Motor	X Dir	Y Enable	Z Dir	Z Step	Z Enable	Y Limit	Z Limit	Y Dir	Y Step	STOP	GND	5v/VDD

The definition of 4-input interface:

P1	P2	P3	P4	P5
X Limit	Y Limit	Z Limit	STOP	GND
Corresponding P10	Corresponding P11	Corresponding P12	Corresponding P13	

Connection Diagram:



Limit setting FOR REFERENCE ONLY:

(*Note: you can also have other settings for other applications)

]

Mach3 Setup

*Simple solutions if the driver does not work properly:

- please double check the software settings according to the Fig.5 and Fig.6
- Please conform the parallel cable has been plugged tightly
- Please turn off the power supply before changing dip settings
- Please use stable high quality DC power supply for this driver
- Problems in Mach3 using, please refer to the Mach 3 User Manual
- if problem persist, please feel free to contact us!

Product Features:

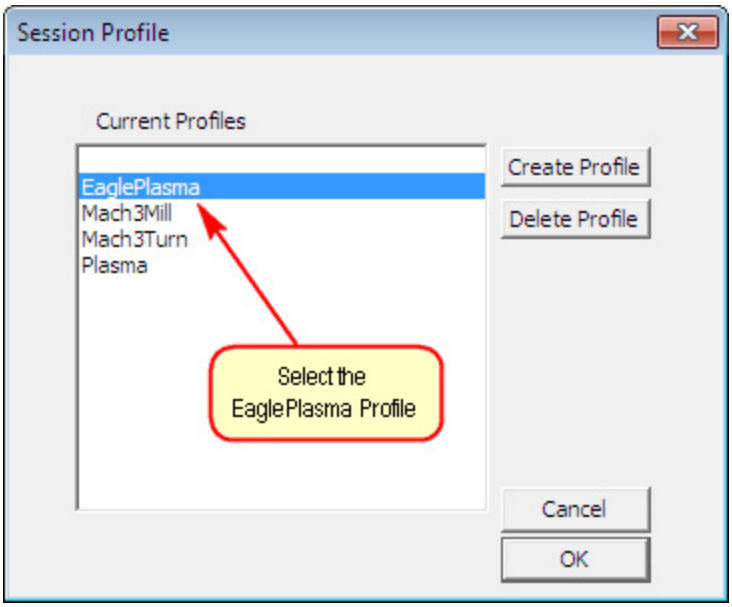
- **Toshiba TB6560AHQ chip - High power, maximum 3.5A drive current chipset!**
- **1 -1/16 micro step setting - Higher accuracy and smoother operation than standard 1, 1/2 step!**
- **Adjustable 1.5A-3A drive current settings for each axis - 25%, 50%, 75%, 100% of full current can be set for different stepper motors**
- **Overload, over-current and over-temperature safety - Full protection for your computer and peripheral equipment!**
- **on board current switching - Power output can be set according to specific user requirement!**
- **Full closed-type optical isolation to protect the user's computer and equipment**
- **Relay spindle interface - Outputs Max. 36V 7.5A for spindle motors or coolant pump (only one device can be powered by this output!)**
- **4 -channel inputs interface- can be used for XYZ limit and emergency stop!**
- **Professional design - Two-stage signal processing with super anti- jamming!**
- **bipolar constant current chopper drive with non-resonant region - Controls motors smoothly through range without creep effect!**
- **Four control inputs (divided into pairs of knives) - Allows setting of limit and emergency stop!**
- **Universal architecture - Supports most parallel software MACH3, KCAM4 etc!**

Dip settings:

Current Setting	1	2	Decay Mode Settings	3	4	MicroStep Settings	5	6
100%	ON	ON	FAST	ON	ON	1	ON	ON
75%	ON	OFF	25%	ON	OFF	1/2	ON	OFF
50%	OFF	ON	50%	OFF	ON	1/8	OFF	OFF
25%	OFF	OFF	SLOW	OFF	OFF	1/16	OFF	ON

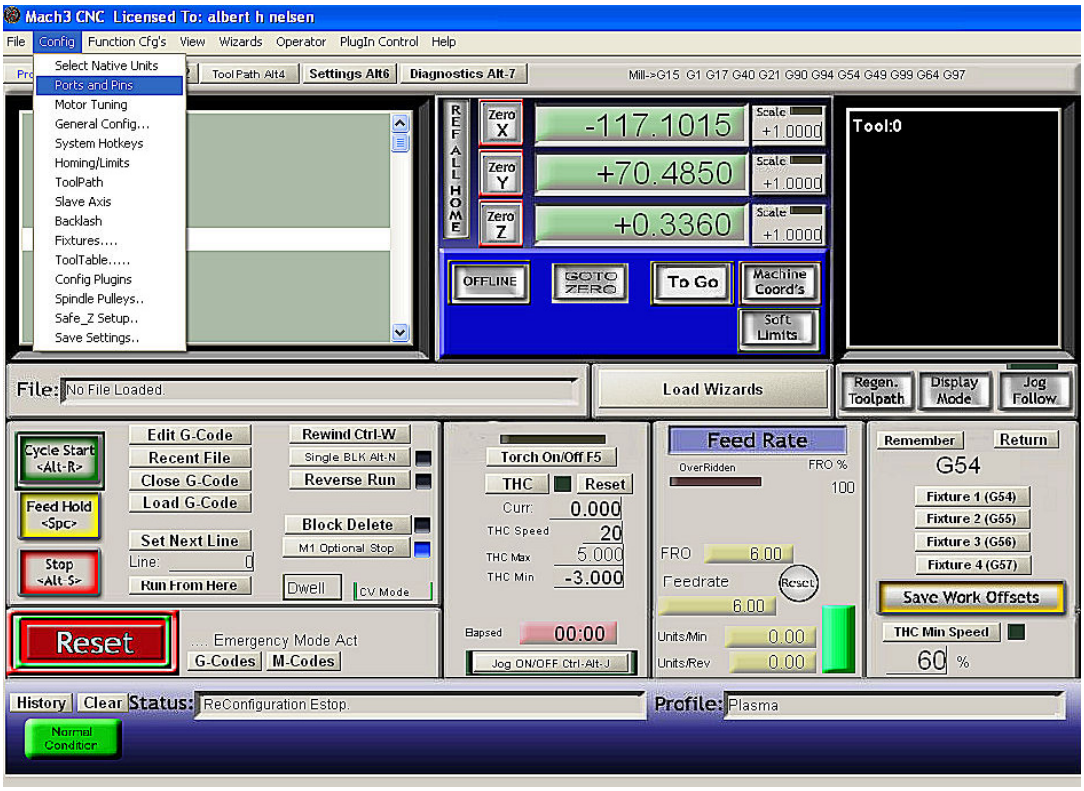
How to Set Up THC

Open Mach3 using the **Mach3 Loader** icon or select **Mach3 Loader** from the Start Menu.

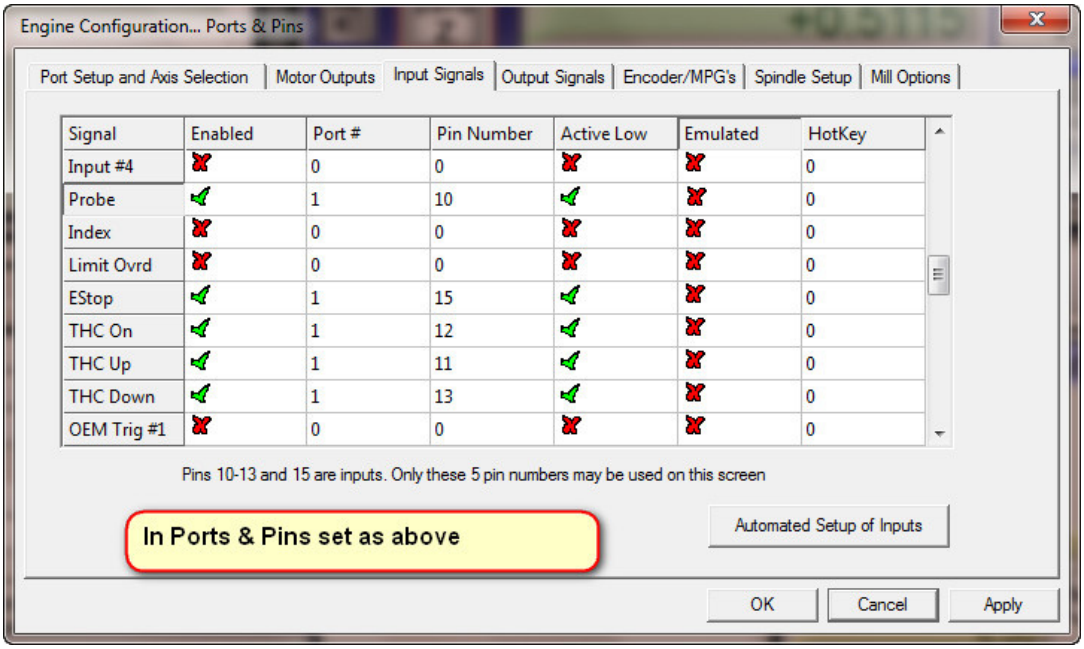


Select the **EaglePlasma** profile; click **OK**.

How to Set Up THC

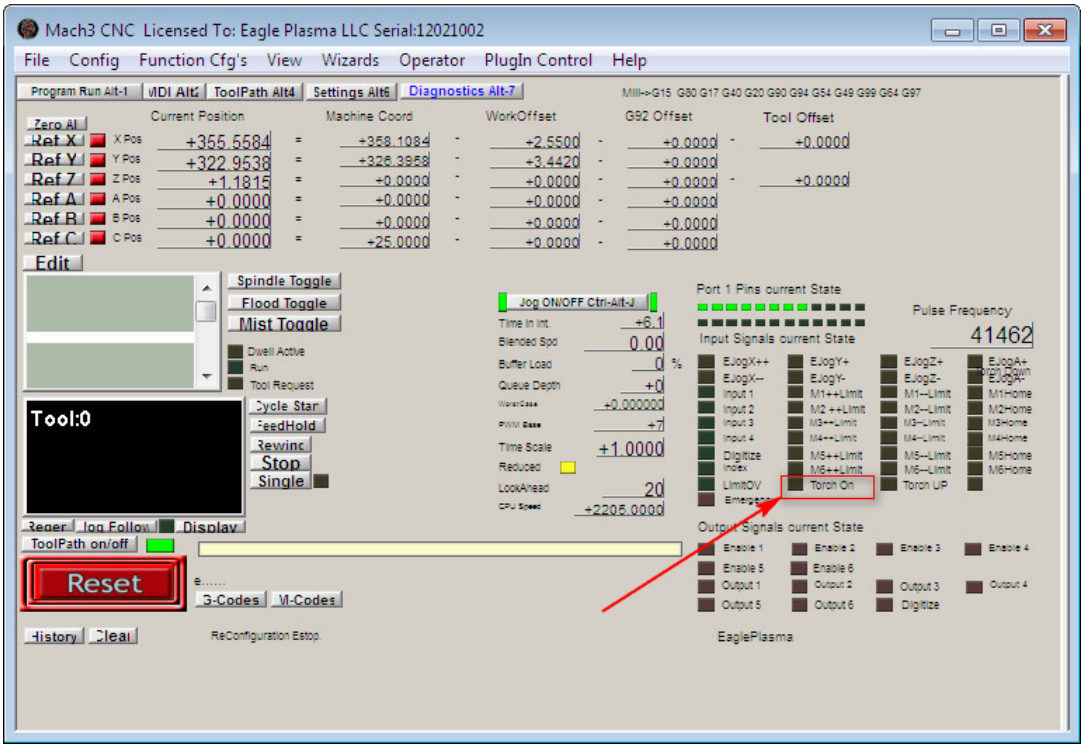


Select the **Config** menu; select **Ports and Pins**.

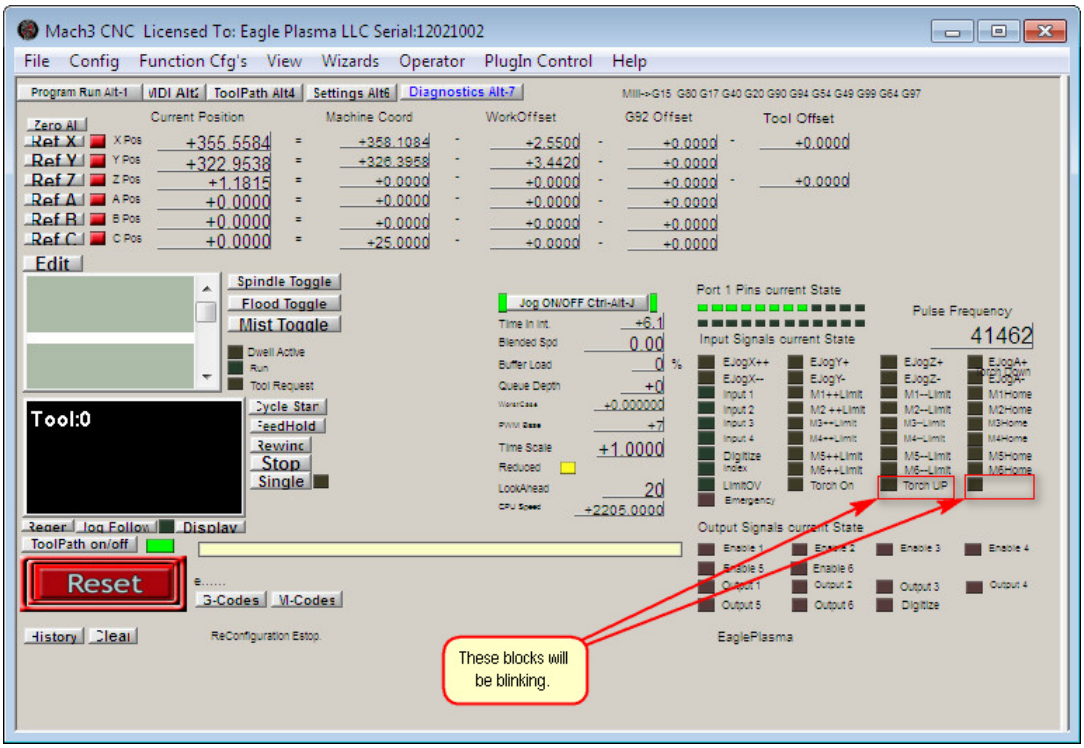

Engine Configuration... Ports & Pins
Port Setup and Axis Selection
Motor Outputs
Input Signals
Output Signals
Encoder/MPG's
Spindle Setup
Mill Options
Signal | Enabled | Port # | Pin Number | Active Low | Emulated | HotKey
Input #4 | 0 | 0 | 0 | 0
Probe | 1 | 10 | 0
Index | 0 | 0 | 0 | 0
Limit Ovrd | 0 | 0 | 0 | 0
EStop | 1 | 15 | 0
THC On | 1 | 12 | 0
THC Up | 1 | 11 | 0
THC Down | 1 | 13 | 0
OEM Trig #1 | 0 | 0 | 0 | 0
Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen
In Ports & Pins set as above
Automated Setup of Inputs
OK
Cancel
Apply

In **Ports and Pins** select the **Input Signals** tab; set as above. Click **Ok**.

How to Set Up THC



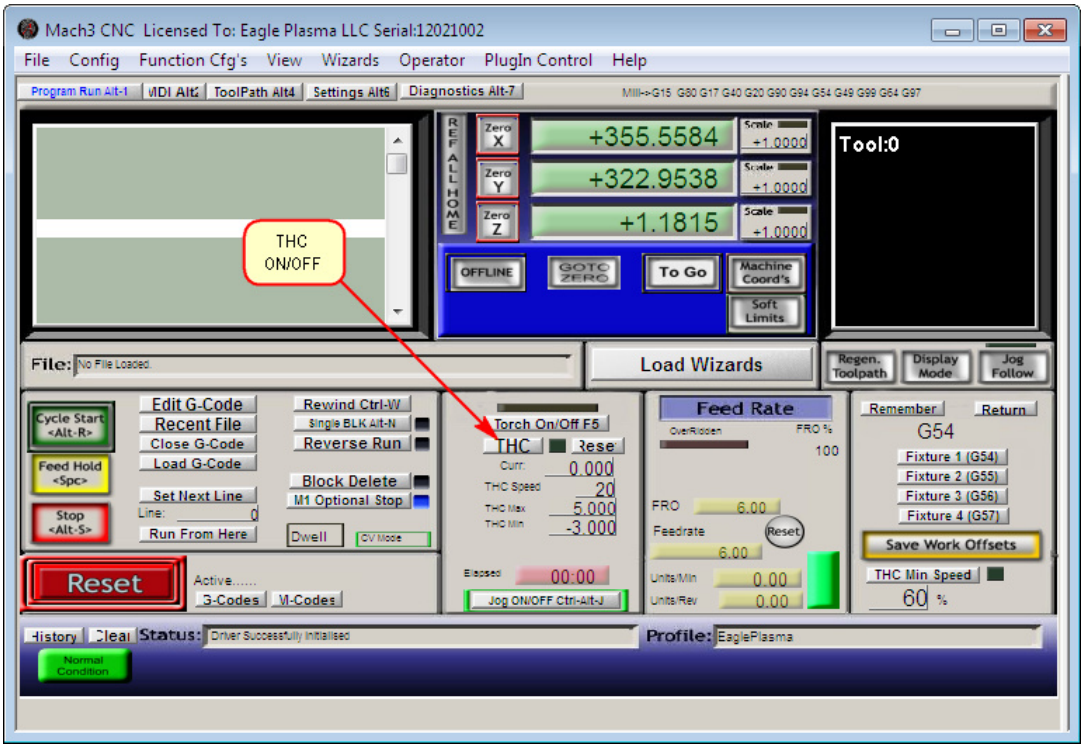
Click on the **Diagnostics Alt-7** tab. Place the THC into **Test Mode** by pressing the up and down arrows on the THC at the same time; release when the display reads **Test.** The **Torch On** block will come on.


Mach3 CNC Licensed To: Eagle Plasma LLC Serial:12021002
File Config Function Cfg's View Wizards Operator PlugIn Control Help
Diagnostics Alt-7
Torch UP
These blocks will be blinking.
EaglePlasma

The **Torch Up** and **Torch Down** blocks will blink in step with the lights on the THC.

How to Set Up THC

Return to the **Program Run Alt-1** tab.



Run code with the **THC Off** and note the voltage on the THC. Before the next cut, enter the voltage noted by pressing the **up or down** arrow on the THC. This number will remain until changed. Now when you cut with the THC turned on, Mach3 will move the torch up and down to maintain height.

Operation Manual

Plasma torch height controller.

Model: Compact THC Controller 150

Notes on safety

WHEN THE DEVICE IS IN OPERATION, VOLTAGE HAZARDOUS TO HEALTH AND HUMAN LIFE IS PRESENT INSIDE THE HOUSING AND AT THE CONNECTION TERMINALS

The device should be connected only by a qualified and authorized person. Improper connection can cause serious injury or death. Prior to installation and operating, carefully read the entire installation and maintenance manual and be absolutely sure, you full understand and are able to make the sole decision to determine if you are capable of a safe and proper installation. Remember that, inside the device and at the connection terminals, voltage hazardous to health and life may be present.

The following actions, although not all inclusive, should be strictly adhered to:

Installation of this product by an unqualified individual should not be done.
No physical contact with any electrical connections while under power.
Do not operate this product with wet hands, wet gloves, or any wet clothing.
Before turning the unit on, secure the safety of others, and read and understand all instructions. If you have any questions or concerns, do not continue.

Warning: Provide adequate protection for all risks associated with plasma cutting.

For more detailed information of the risk associated with plasma cutting, refer to your plasma cutter's owner manual.

Touching non-insulated and non-grounded elements can be fatal. Provide a safe place for your device. After assembly, secure protection of contact terminals from operator's touch.

It is strictly prohibited to perform any repairs or modifications to this product! - Performing either one of these actions could lead to serious injury or death to yourself and/or others.

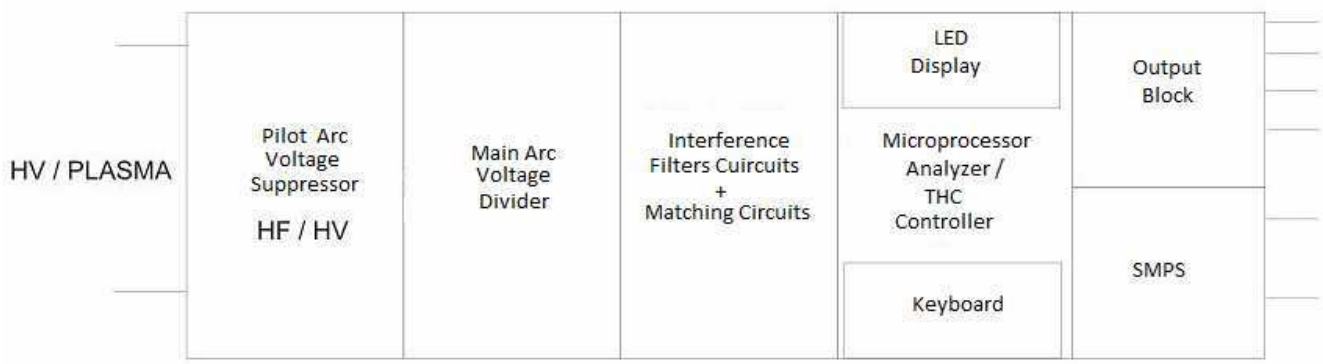
Terms of Use: By proceeding with installation and use of this product, you fully understand and agree Proma-Elektronika nor their distributors, are not liable for any incident or event resulting in direct loss, indirect loss, injury to self or others, damage to property, or loss or damage of any kind. End user assumes all risks. If you do not agree to these terms in it's entirety, proceed no further, and return this product for a full refund.

If you have any questions or are unsure about anything stated in this manual problem, immediately contact a Proma-Elektronika dealer or service centre for assistance.

Device Information

The unit is a modern analogue - microprocessor plasma torch height controller that operates by analyzing voltage changes in the plasma source due to variations in height between the torch tip and the material being cut. The microprocessor makes determinations to raise or lower the torch based off of the strength of the voltage signal being read. It is equipped with an easy to read LED display and two user friendly keys making operation simple and does not require any additional measuring instruments. The device has patented solutions made with the highest quality components to ensure a safe, durable, and reliable long-term operation.

Simplified block diagram:



Pilot Arc Voltage Neutraliser - protection system, which is responsible for removing spikes in the AC electrical flow, which can be caused by a plasma source with contact-less arc striking (HV/HF pilot arc) generating a high voltage or from surges coming from plasma cutters equipped with contact arc striking system.

Main Arc Voltage Divider – While in operation, the cutter generates dangerous voltage levels, unsafe for precision electronics. A voltage divider system is incorporated to reduce this voltage to a safe level.

A quick acting filter system removes any interference that may pass through a voltage divider.

Filtered and scaled voltage values derived from the plasma cutter's “raw arc voltage” are then sent to the brain of the device. The "brain" consists of a programmed microprocessor, which in addition to the analysis of the cutting voltage parameters and proper output blocks controlling, also supports the LED display and function keys.

A built-in switching power supply ensures compatibility in a wide range of power supply voltages without the need for heat sinking. The power supply connection is optically isolated from the rest of the system which allows you to use to share power from existing systems providing they output the recommended voltage.

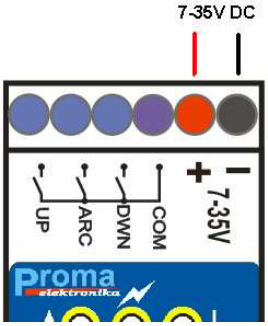
The last block is a relay output circuit, to which the driver/PC inputs are connected, which is responsible for Z-axis motor control of the CNC plasma cutter.

The main parameters of the device:

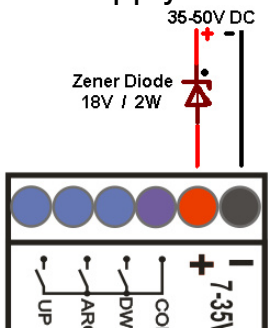
Parameter name	Acceptable	TEST*
Supply voltage (V)	7 – 35V DC	36VDC*
Maximum input current	120mA	-
Maximum direct input voltage	300VDC	1000V DC*
Maximum input voltage of 1:50 divider	10VDC	60V DC*
Ability to eliminate HV/HF ionizing voltage	0.3kVAC	30kV AC*
Ability to eliminate HV/HF ionizing frequency	>100kHz	75kHz
Duty cycle (%)	100%	-
Duty Cycle of HV/HF elimination (%)	100%	-
Capacity of relays	50mA / 60V DC	-
Life of used relays (declared minimum switching) with a capacity of 5V/10mA	500 000 000 cycles	-
Degree of protection	IP20	-
Weight (g)	130g	-
External Dimensions (L * W * H) [mm]	33*89*65	-
Mounting	DIN35 rail	-

* Tested in the laboratory.

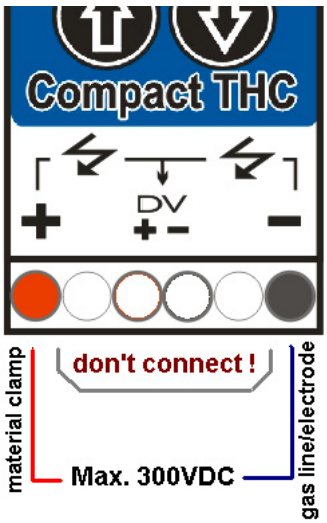
Power Connection:



Optional power supply 35-50V:



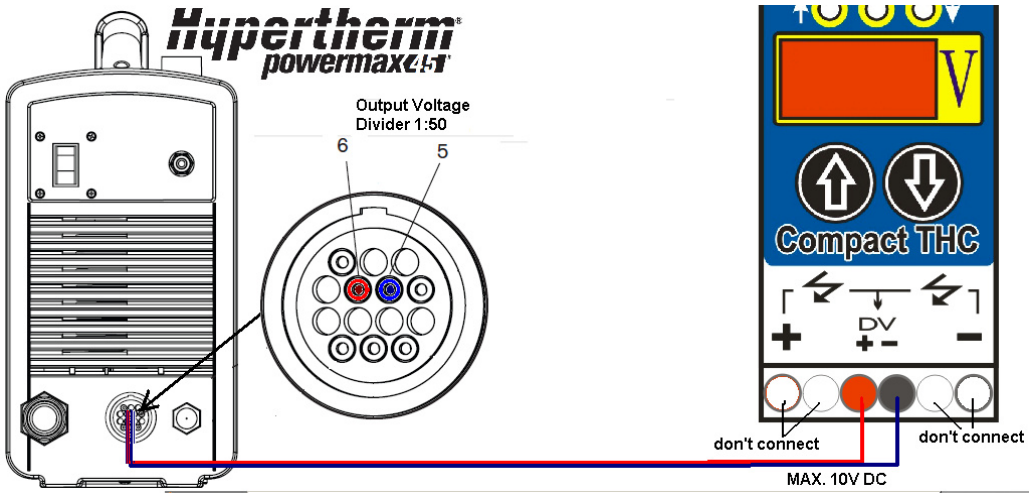
For lower **limit** switches of the device, one can lead full output voltage of plasma source. In this connection **do not connect anything to the other input terminals of the controller.**



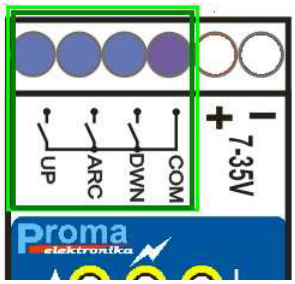
When connecting directly, use the shortest possible cables for connecting the plasma source with THC controller - it is recommended the THC controller to be located directly at the plasma source.

While being a universal THC, accepting full raw arc voltage for most any plasma cutter on the market, an exciting new standard feature of this unit is the addition of a 1:50 divider for an extremely fast, simple installation on most major brands. There will most likely be a direct connection for this on the outside of the plasma cutter's unit. Please refer to your plasma cutter owner's manual.

An example of how to connect the THC controller's measurement input with the output of the very popular Hypertherm Powermax45® - The THC comes standard equipped with a low voltage output of **1:50 divider**. This ratio is the most commonly used division in most major brands and there will most likely be a plug for this connection on the outside of the cutter's unit.



Description of relay outputs:



The relay outputs “Arc, Up, Down”, are controlling outputs via relays, and should not be utilized for anything other then it's intended use.

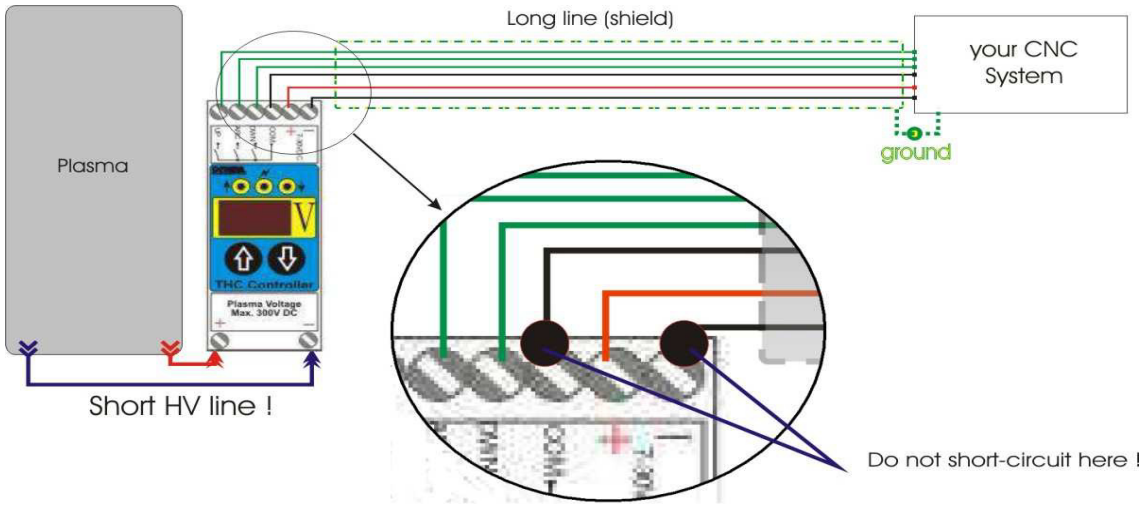
COM terminal is a common input terminal connected to the ARC, UP and DOWN relay contacts inside the device, according to the diagram located on the cover (above picture). Suggested route is to “GND” at driver/pc end. Do not jumper this connection to the “7-35V” negative.

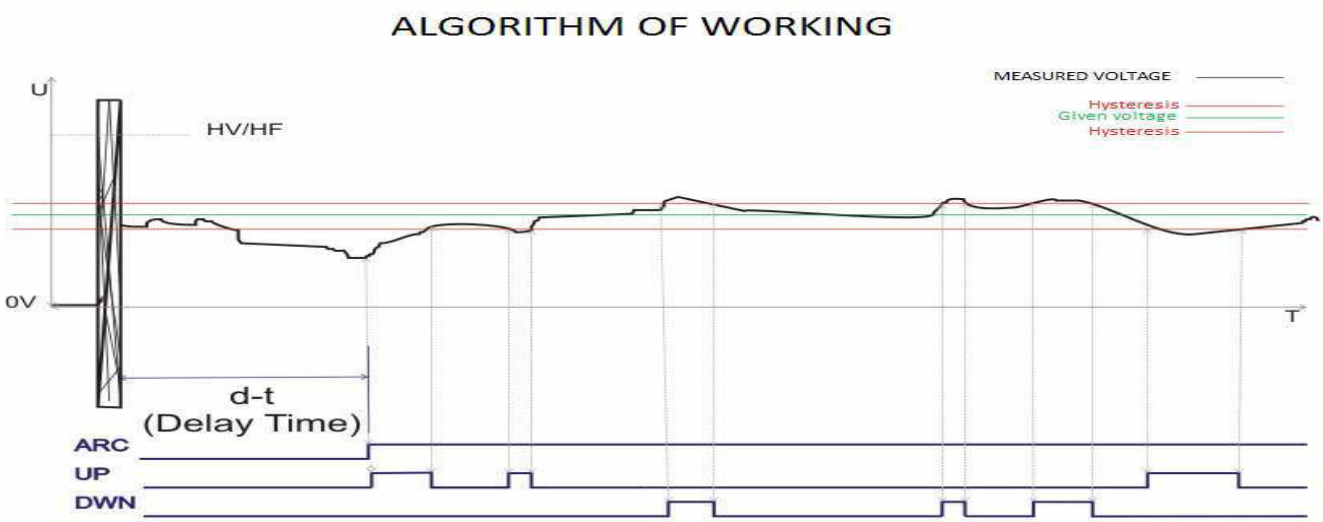
ARC output (also known as “Arc Okay”) is activated when plasma ignition is detected. Route and configure for a software input. Not required to operate.

UP output is activated when the measured voltage is lower than the voltage setpoints, reduced by half the hysteresis voltage. Route and configure for a software input.
DOWN output is activated when the measured voltage is higher than the voltage setpoints, reduced by half the hysteresis voltage. Route and configure for a software input.
Note: No output relays are activated in case when only the pilot arc is detected and when the main arc is broken.

Relay outputs should be connected to the CNC system in accordance with the documentation of the CNC electronic system controlling the machine. For this, we use inputs of outermost connectors HOME or LIMIT - THC relay contacts should be connected to the terminals the same way as limit switches connectors. At the same time, the common COM terminal relay should be connected to the CNC system to a common terminal for limit switches (it is usually a GND terminal).

To reduce the possibility of the short-circuit entering the CNC system, the connection should be made with a shielded cable - the shielding must be connected to grounding on the CNC system side. Do not connect the shielding to the THC controller side.





Start-up and operation:

The device is pre-configured at the factory and after the correct connections are made, it immediately works properly with most plasma devices. After switching power on, the THC controller's display shows an "animated" "thc" message, and then a flashing voltage value is presented for 1 second; the device is undergoing automatic calibration at this moment.

When the device is ready for operation it displays "- - - " which means, that there is no input voltage.

In this state, by depressing both the up/down keys, simutaneously and holding for a few seconds, the voltage setpoints can be modified and thus set the torch's height above the material. Press shortly once to display the set value without modification.
To determine other parameters simultaneously hold both keys until you see the desired parameter on the display - when you release the keys, its value will be displayed - using the up/down keys to set the desired value:

"HYS" (Hysteresis) - The hysteresis voltage - a range in which the voltage is measured, in which there are signals controlling UP/DOWN 2-30V (±1V - ±15V) - factory setting: 8V (±4V)

"d - t" (delay time) - delay time of output closed despite no supply voltage, when the system detects the main (cutting) arc 0.1 - 9.9s factory setting: 0.5s

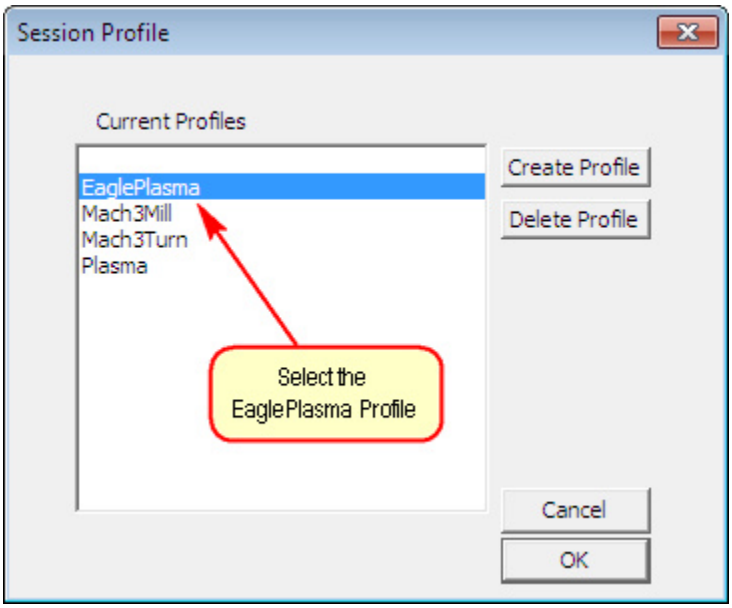
"H - U" (High Voltage) - value of the off load voltage detection in the plasma cutter - used to detect the main (cutting) arc: 50-300V by default: 200V

"tSt" (Test) - Simulation of the controller's work - the system simulates the appearance of "floating" voltage within the selected value - causes the activation of inputs for easy system testing without switching the cutter on.

When the plasma cutter is switching on, the display presents the measured voltage value and LED diodes present the current status of outputs. Fast blinking of the measured value indicates the detection of pilot arc; continuous display indicates the detection of the main (cutting) arc.
All parameters can be modified during operation; these changes are reflected in real time in the control of output signals.

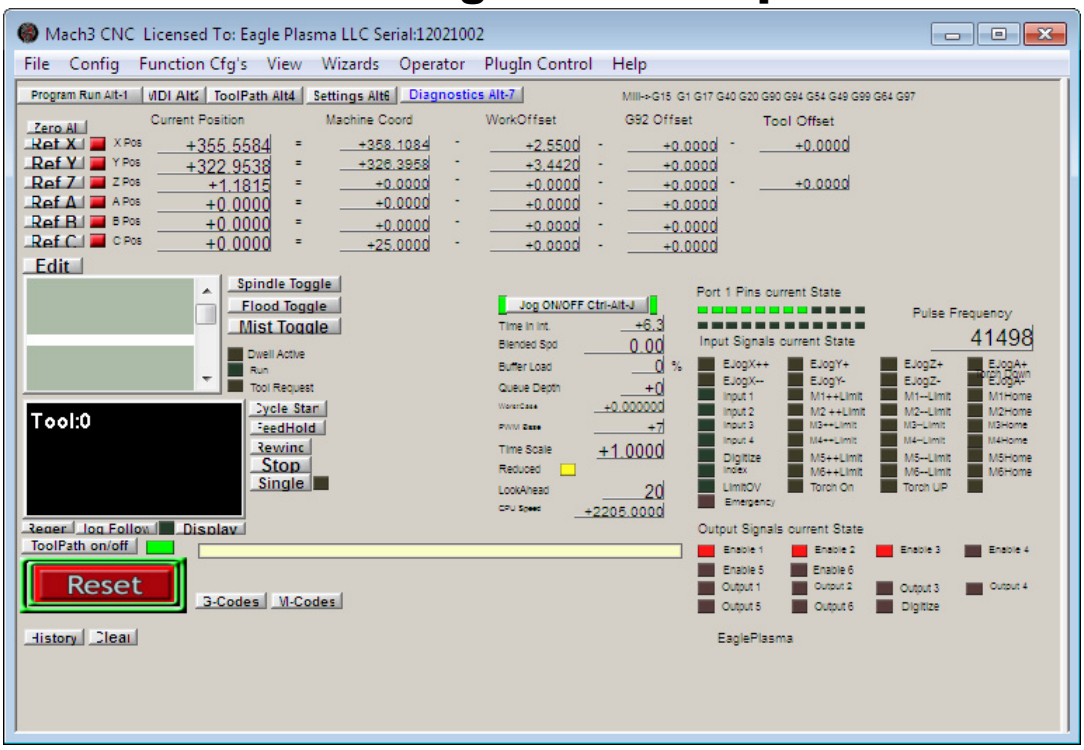
Floating Head Set-up

Open Mach3 using the **Mach3 Loader** icon or select **Mach3 Loader** from the Start Menu.

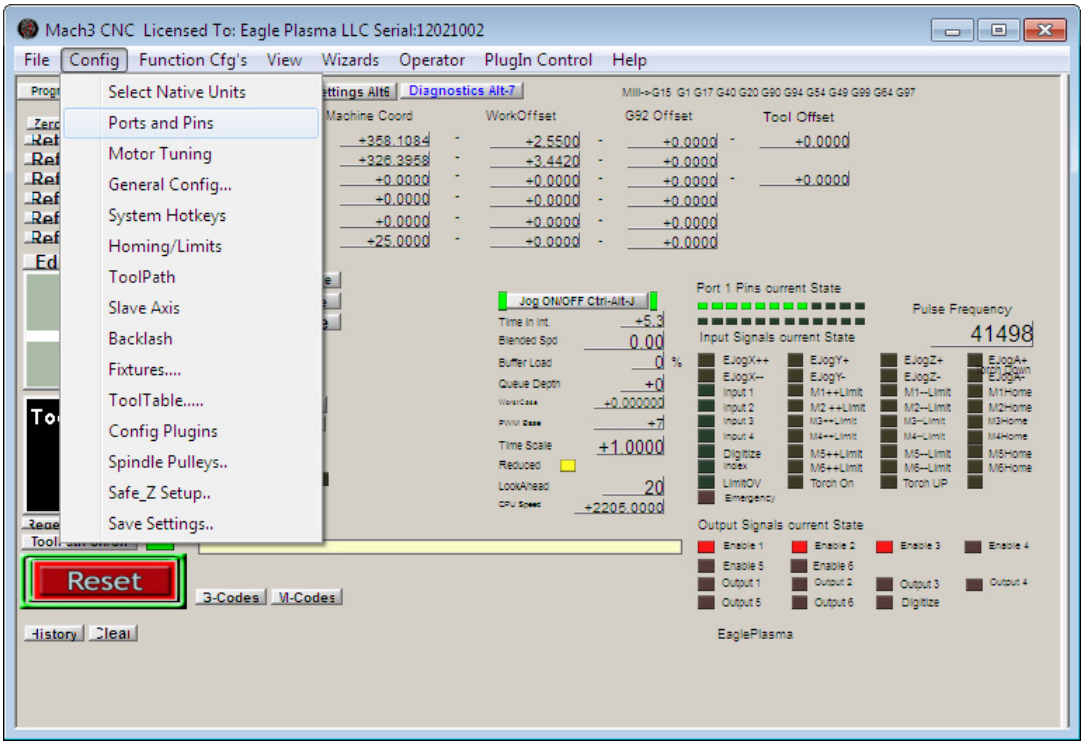


Select the **EaglePlasma** profile; click **OK**.

Floating Head Set-up

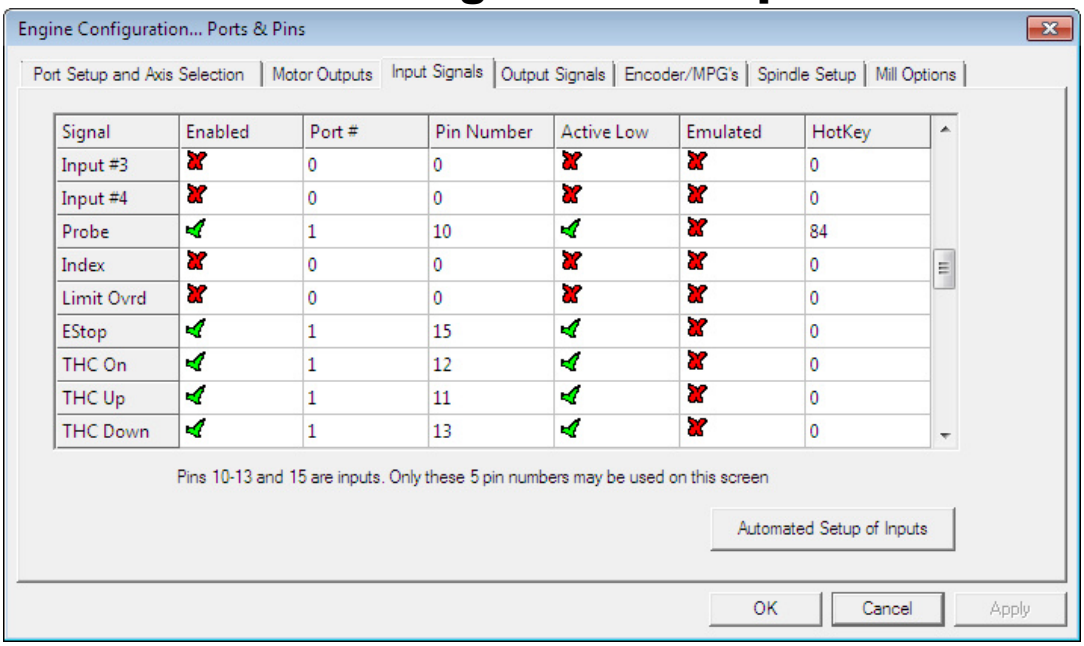


Click on the **Diagnostics Alt-7** tab.

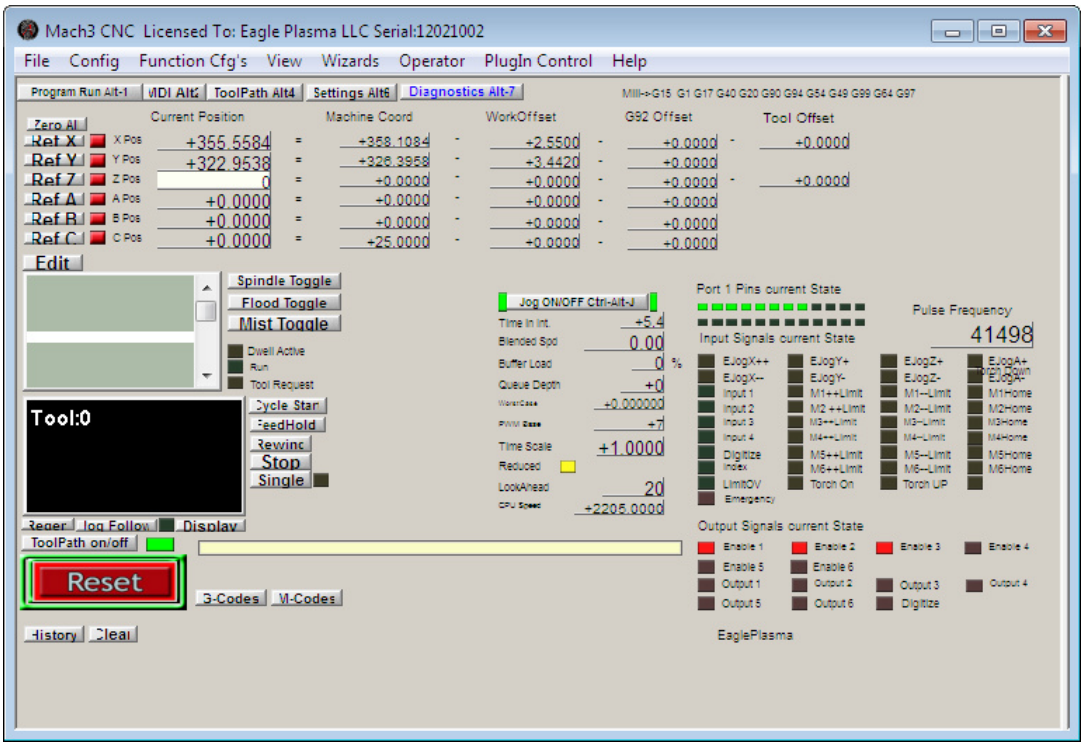


Select the **Config menu**; select **Ports and Pins**.

Floating Head Set-up

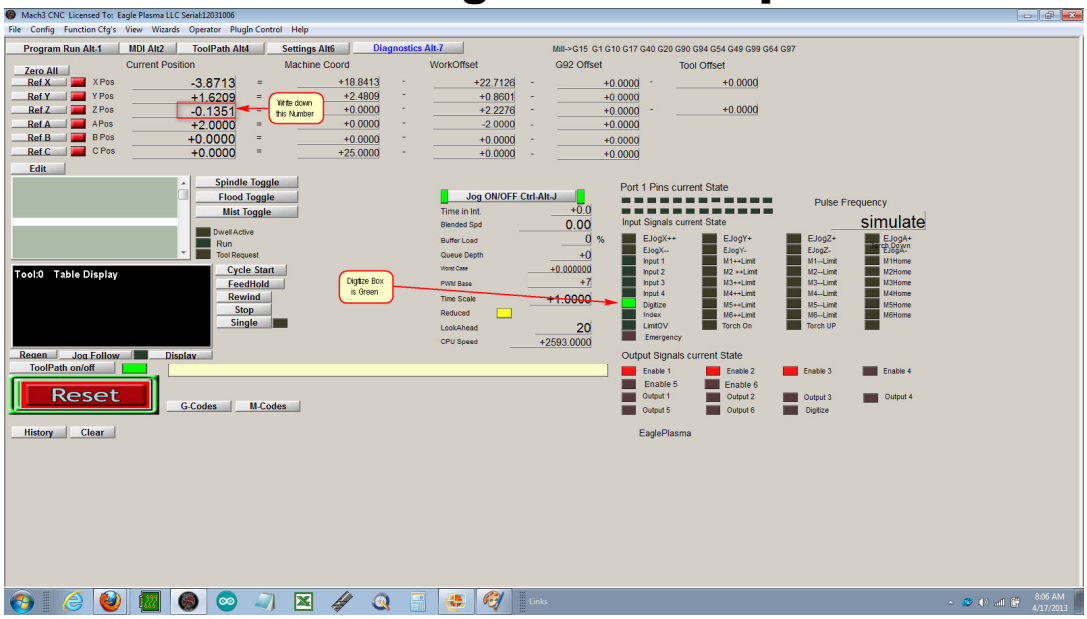

Engine Configuration... Ports & Pins
Port Setup and Axis Selection
Motor Outputs
Input Signals
Output Signals
Encoder/MPG's
Spindle Setup
Mill Options
Signal | Enabled | Port # | Pin Number | Active Low | Emulated | HotKey
Input #3 | 0 | 0 | 0 | 0
Input #4 | 0 | 0 | 0 | 0
Probe | 1 | 10 | 1 | 84
Index | 0 | 0 | 0 | 0
Limit Ovrd | 0 | 0 | 0 | 0
EStop | 1 | 15 | 1 | 0
THC On | 1 | 12 | 1 | 0
THC Up | 1 | 11 | 1 | 0
THC Down | 1 | 13 | 1 | 0
Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen
Automated Setup of Inputs
OK
Cancel
Apply

Select the **Input Signals** tab and make sure the **Probe** is set as above. Click **OK.**

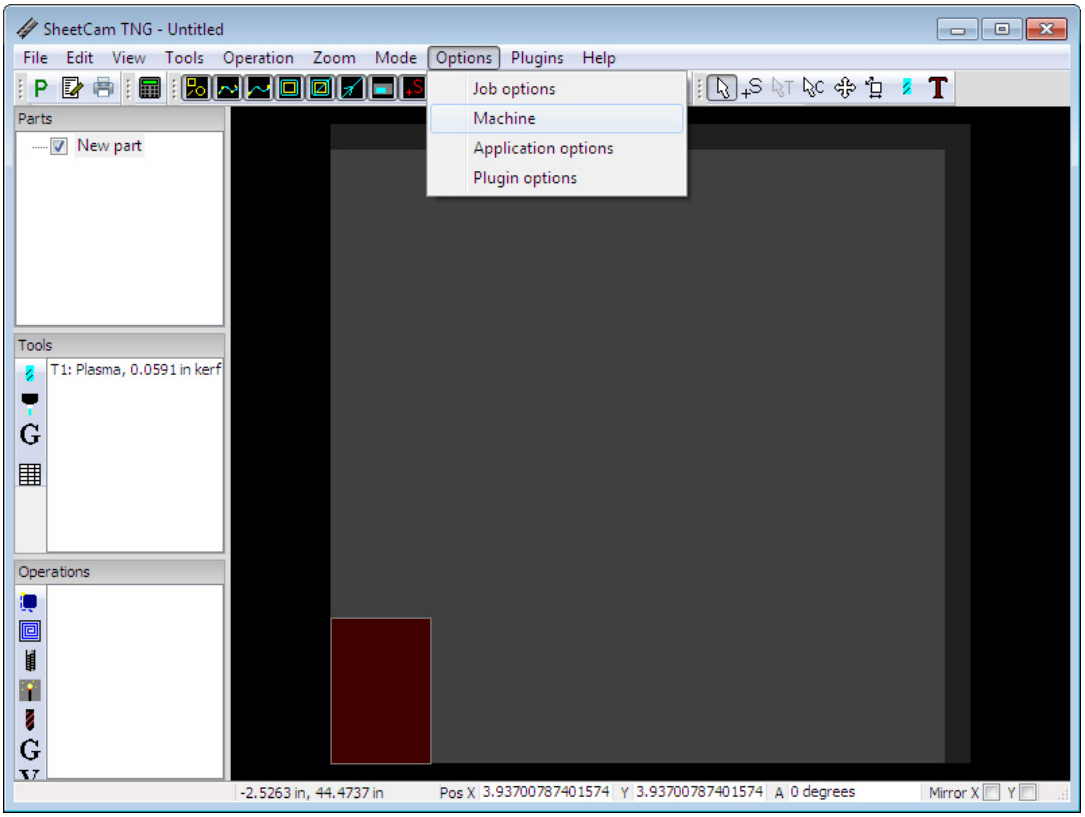


Move the torch down until the tip is just at the metal and type 0 (zero) in the **Z Pos - Current Position** area; press the **Enter** key.

Floating Head Set-up

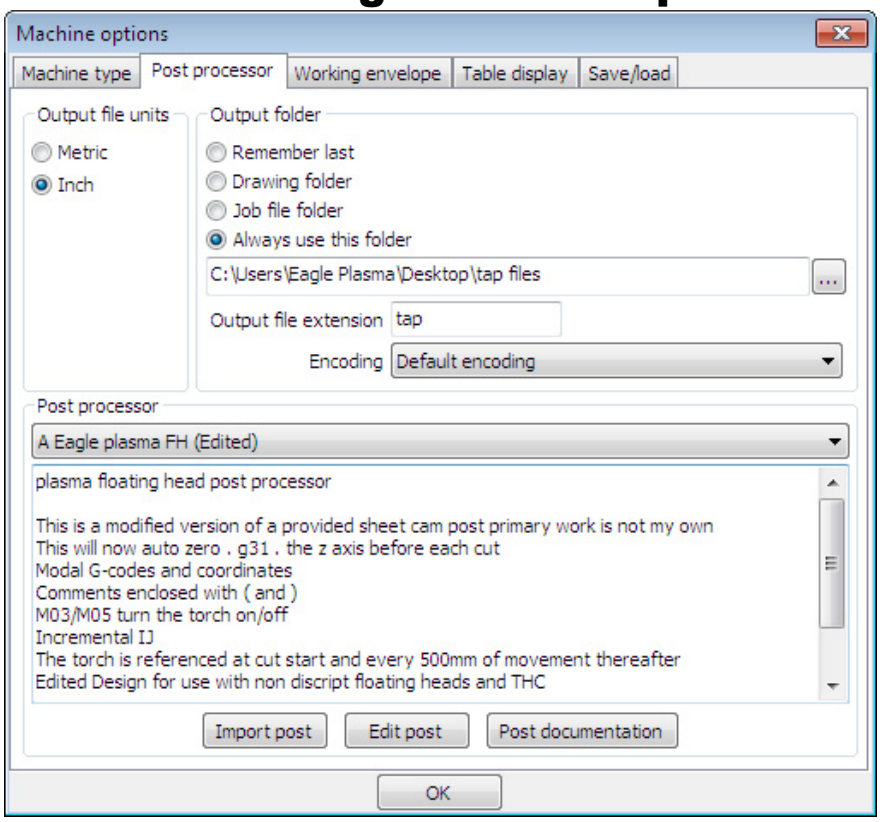


Move the torch down until the **Digitize** box turns green. Write down the number in the **Z Pos – Current Position** area.

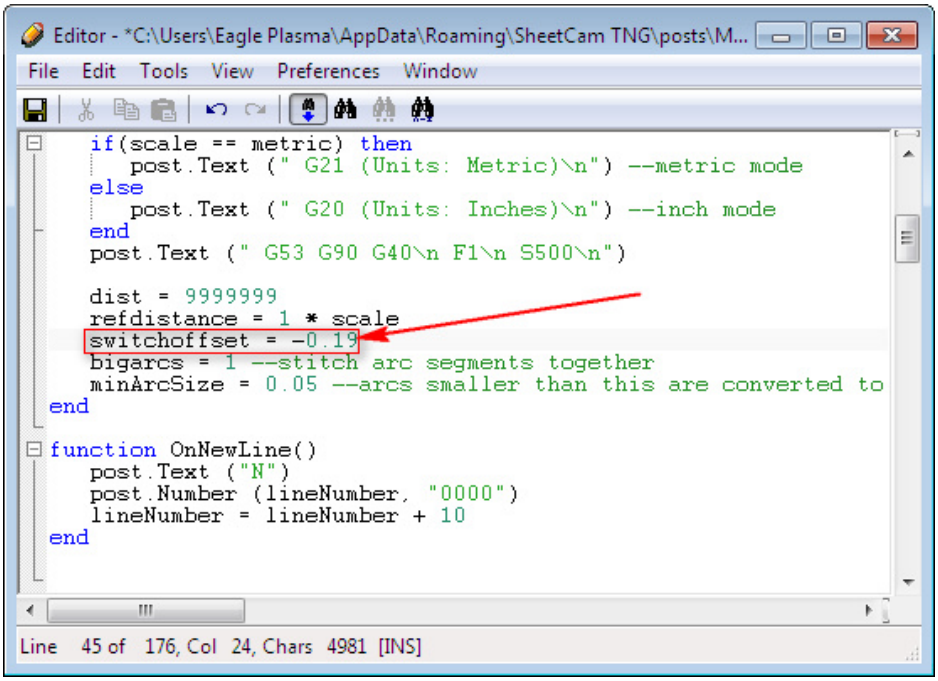


Open **SheetCam TNG**. In the **Options** menu, select **Machine Options**.

Floating Head Set-up

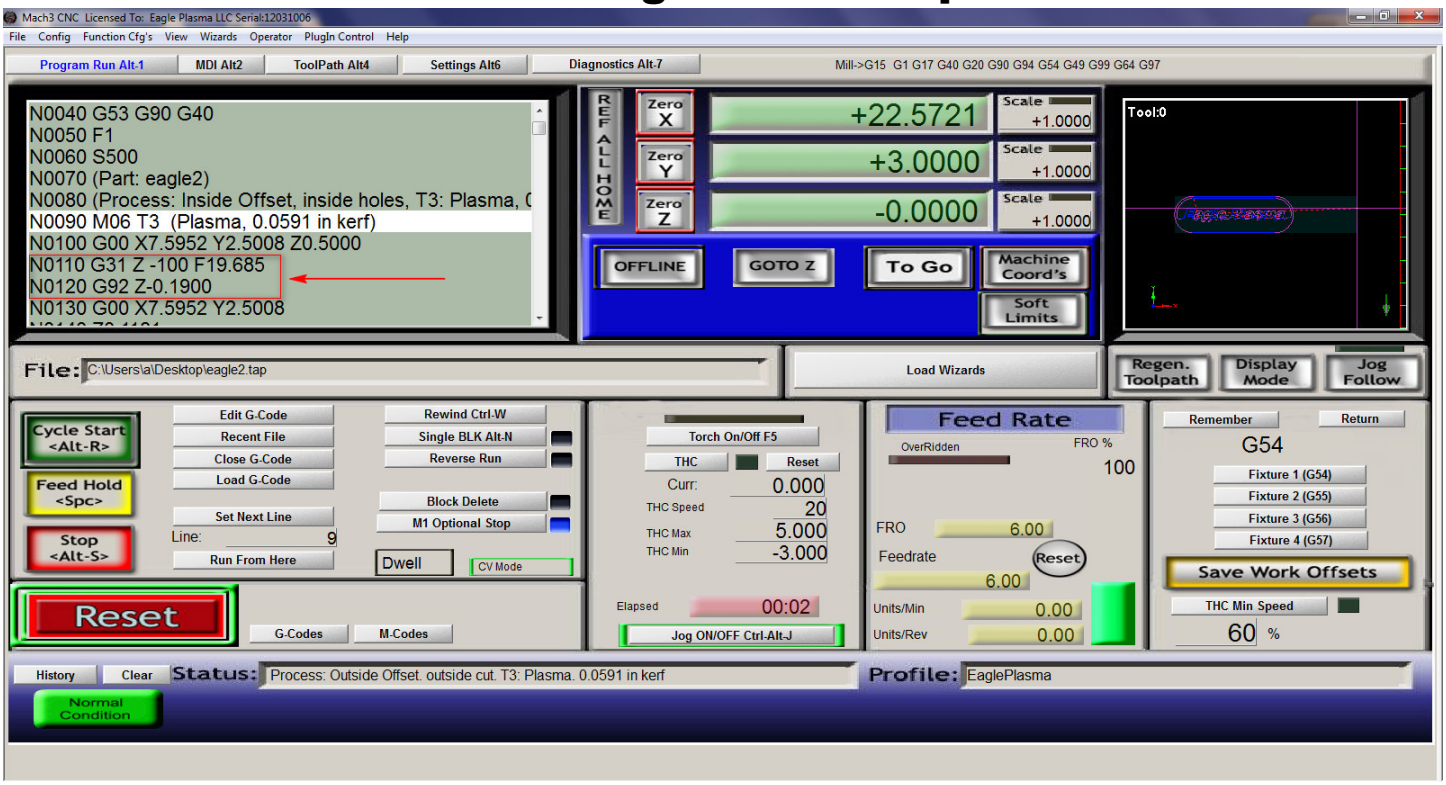


Select the **Post processor** tab, under the Post processor **drop down menu**; select **A Eagle plasma FH**; click **OK**. Select **Edit post**.


Editor - *C:\Users\Eagle Plasma\AppData\Roaming\SheetCam TNG\posts\M...
File Edit Tools View Preferences Window
if(scale == metric) then
post.Text (" G21 (Units: Metric)\n") --metric mode
else
post.Text (" G20 (Units: Inches)\n") --inch mode
end
post.Text (" G53 G90 G40\n F1\n S500\n")
dist = 9999999
refdistance = 1 * scale
switchoffset = -0.19
bigarcs = 1 --stitch arc segments together
minArcSize = 0.05 --arcs smaller than this are converted to
end
function OnNewLine()
post.Text ("N")
post.Number (lineNumber, "0000")
lineNumber = lineNumber + 10
end
Line 45 of 176, Col 24, Chars 4981 [INS]

Scroll down to the **switchoffset** entry and replace –0.19 with the number noted earlier under the **z pos – current position** field in Mach3. The number entered must be in the same format as above. Go to the **File** menu; click **Save**.

Floating Head Set-up



In Mach3, under the **Run Alt-1** tab, the G31 code on line N0110 tells Mach 3 to move down as much as 100” until the digitize switch closes; then the control passes to line N0120. G92 then sets the offset to the number from SheetCam and sets Z-axis to zero.